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Control of Grasshoppers in Alberta — 1986

Crop Protection Branch

Cool, wet weather in August and September, 1985 resulted in reduced egg laying throughout much of the grasshopper-infested areas of the province. Agricultural land will be infested again this year but at less than the 1985 level. This publication describes the risk of infestation in 1986, grasshopper biology, grasshopper management practices and pesticide safety.

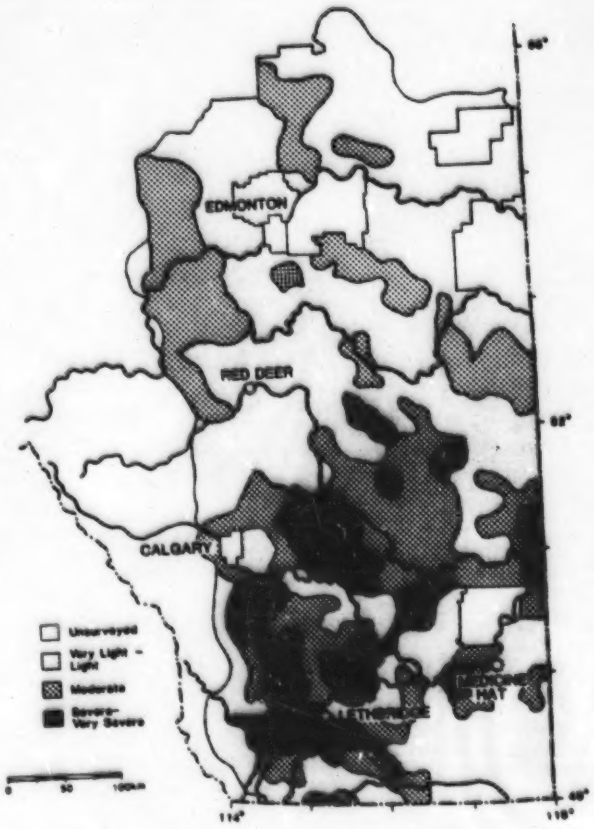
1986 Grasshopper Forecast

The 1986 grasshopper forecast is based on adult grasshopper population surveys taken in late July and early August, 1985, and coordinated by Agriculture Canada, Lethbridge in cooperation with county and municipal fieldmen.

Although the map indicates that even more agricultural land is at risk of moderate to very severe grasshopper infestations than last year, the wet fall had an impact on egg laying. Late summer and early fall is the grasshopper breeding period and egg laying was brought to an early halt by the cool wet conditions that prevailed.

Surveys of grasshopper eggs conducted after the breeding season show that despite the increased abundance of grasshoppers in 1985, the late summer weather had a major influence on the population. Grasshoppers in severely infested areas layed only one-quarter the number of eggs per grasshopper as in the fall of 1984. It is likely that some areas did not benefit from unfavorable weather as much as others. Severe infestations will still occur in such areas unless spring weather is cool and wet. In general, a cool wet spring will reduce the grasshopper hazard by slowing the rate of egg development, reducing the survival of hatching grasshoppers and by allowing crops to get a head start.

Detailed forecast maps are posted at all district extension, county and municipal offices and grain elevator offices each spring.



Monitoring in Alberta — 1986

The key to reducing grasshopper damage is proper and timely application of controls. Spray operations which are too early, too late, too light or too heavy, mean lost revenue. To assist farmers in determining the timing and extent of action required, a special spring survey of eggs and grasshoppers will be conducted again this year as a combined operation of Agriculture Canada and Alberta Agriculture. Updates on the grasshopper situation will be released to the media regularly during the spring and summer.

Grasshopper Life Cycle

Grasshoppers overwinter as eggs laid in pods in the upper 2-3 cm of soil from midsummer to freeze up. During a long warm fall grasshoppers may lay 10 or more pods, each containing from 20 to 100 eggs. The

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pods are deposited primarily in sod adjacent to crops — ditch banks, roadsides, and pastures. Few pods are laid in clean summerfallow. The eggs hatch into small wingless nymphs about 2 mm in length usually between mid-May and the first week in June. Eggs can hatch as early as the first week in May under warm, dry conditions or as late as July in cool, wet weather. The nymphs grow rapidly under hot, dry conditions and within five weeks may reach the adult flying stage.

Where to look for Grasshoppers

On a daily basis, closely examine sod adjacent to crops — ditch banks, drift ridges, pastures and forage fields — commencing about mid-May. Check locations where large numbers of grasshoppers were noted the previous year. Grasshoppers will appear first in locations with southern exposures; monitor development of the young grasshoppers at these sites. This year also monitor re-seeded stubble fields since grasshoppers may be present in minimum till or chem-fallow lands.

Assessment of Hopper Populations

Before undertaking any control measures, assess the degree of infestation by estimating the number of grasshoppers per square metre (or square yard) in infested areas. Light infestations rarely require control measures. Farmers should be prepared to undertake control measures when moderate to very severe infestations are present. The infestation ratings are explained in the following table developed by Agriculture Canada.

Number of Young and Adult Grasshoppers Per Square Metre (Yard)

Rating	Field	Roadside	
Very light	0-3	0-6	Control measures usually not necessary
Light	4-6	7-12	Control measures may be required occasionally
Moderate	7-12	13-24	Control measures may be required to protect crops
Severe	13-24	25-48	Control measures should be undertaken to protect crops
Very Severe	over 25	over 49	

Cultural Control

The following cultural practices, when integrated with proper weed control and soil and moisture conservation, can reduce and control grasshopper populations.

1. Cultivation of stubble immediately after harvest will loosen the soil and discourage egg laying. Shallow cultivation of infested fields in the fall may destroy eggs by exposing them to predators and the elements, but cultivation for this purpose alone is not recommended.
2. Proper weed control can reduce grasshopper damage: (1) in the fall by deterring egg laying and (2) in the spring by starving some of the hatching nymphs.
3. Seed early since advanced crops suffer less economic damage. Use good seed, fertilizers and weed control to promote early, vigorous crop growth.
4. Summerfallow in heavily infested areas or be prepared to spray entire fields. On land to be summerfallowed, destroy plants at hatching time and starve the young hoppers. Grasshoppers must have a supply of food immediately after hatching.
5. Use "trap strips" on heavily infested summerfallow. Cultivate a strip about 15 m wide around the edge of the field to be summerfallowed. Work towards the centre leaving a few uncultivated "trap strips" of plant growth. The hoppers will concentrate in these strips. Spray the trap strips with insecticide and wait two days before cultivating.

Chemical Control

Grasshopper numbers alone do not dictate the necessity for control which frequently depends on the weather. Under favorable growing conditions a crop may tolerate high levels of infestation before extensive damage is caused. On the other hand, under hot, dry conditions, small grasshopper populations may cause severe damage. The producer should also take these factors into consideration when applying control measures.

When and Where to Spray

It is very important to spray grasshoppers soon after hatching, while they are more susceptible to insecticides, still concentrated in breeding areas, and before they move into crops. If pastures or fields are completely infested, spraying the entire area may be necessary. Should grasshoppers move off pasture land into crops, spraying the adjacent borders and roadsides on a regular basis as necessary will reduce crop damage and insecticide use.

Unlike the major pest species, some grasshoppers overwinter as adults or late-instar nymphs and become active throughout May. These are of no economic importance although they frequently cause concern among farmers.

Recommended Insecticides For Grasshopper Control

Insecticide	Rate	Crops	Spray Tips and Precautions
Carbaryl (Sevin XLR)	0.5-1 L/ac Up to 1.4 L/ac can be applied on some crops to control adults	Cereals, Forages, Pastures, Rangeland, Non-crop areas	Do not use higher than an 11:1 dilution if maximum wash off resistance is desired. Use low volume nozzles when applying by ground to obtain residual activity. Remove cattle from area while spraying. Forages may be grazed immediately after application. Do not treat cereals within 14 days of harvest. Assess control after at least 48 hours since Sevin is a slow acting product.
Carbofuran (Furadan 480)	110 mL/ac	Alfalfa, Cereals, Corn, Oilseeds, Forages, Non-crop areas, Pastures, Rangeland	Use not less than 40 L/ac water and apply with a boomsprayer equipped with hydraulic or mechanical agitation and 0.3 mm screens; remove all felt filters. Application by aircraft is permitted, provided there is no hazard of drift to other crops or to areas occupied by people or livestock. Use not less than 20 L/ac water by aircraft. **Wear goggles and respirator at all times and wash clothes daily**. Do not treat cereals within 21 days of harvest or make more than two applications per season. Do not treat corn within 7 days of harvest. Do not treat canola within 60 days or flax and mustard within 21 days of harvest and not more than once per season. Do not apply carbofuran to pastures within 1 day of grazing, and sunflowers within 60 days of harvest. Do not treat forages more than twice a season.
Chlorpyrifos (Lorsban 4E)	235-485 mL/ac 235-405 mL/ac	Barley, Oats, Wheat, Canola	Apply by ground or aerial equipment with 20-80 L/ac water on cereal foliage, 16 L/ac water on canola foliage by ground, 4 L water/ac on canola foliage by air. Do not apply to cereals within 60 days of harvest or to canola within 21 days of processing. Apply once per season.
Deltamethrin (Decis)	By ground 40-60 mL/ac in 40-80 L/ac water By aircraft 40-60 mL/ac in 4.5-8.8 L water/ac	Wheat, Barley Flax, Oats	Do not spray when grasshoppers are larger than the 4th nymphal stage, 1 cm (0.5 in.), in length. Do not apply when daytime temperature exceeds 25°C, as a reduction in control will result. Best control will be achieved when application is made during the cool part of the day — dusk or morning. **Can be applied by aircraft in 1988**. The higher rate should be used for severe infestations, on older insects or when a dense crop canopy inhibits penetration. Do not apply to pastures or plants harvested for forage. Do not treat within 40 days of harvest. Do not make more than 3 applications per season. Do not make more than one of those applications by air. Follow special instructions maintaining a 100 m setback from sensitive zones.
Dimethoate (480 g/L formulations)	220-400 mL/ac	Cereals, Forages, Canola Pastures, Rangeland, Non-crop areas	Use 18 L/ac water for good coverage. Do not treat cereals or canola within 21 days of harvest. Do not graze or harvest forages within 7 days of applying the 360 mL/ac rate or 28 days when using the 400 mL/ac rate. For control of grasshoppers over 1 cm (0.5 in.) long or under poor spray conditions apply up to 400 mL/ac. Do not treat when bees are present. Assess control after 48 hours, since dimethoate is a slow acting product.

Recommended Insecticides For Grasshoppers Control continued

Insecticide	Rate	Crops	Spray Tips and Precautions
Dimethoate (Hopper Stopper Bran Bait)	0.8-1.2 kg/ac	Cereals, Canola, Pastures, Waste Areas, Forages	Apply bait dry and broadcast evenly. Apply not more than once/2 weeks for moderate to low infestations. Beef cattle do not have to be removed during treatment. Do not graze dairy cattle or harvest treated forage for 48 hours. Do not harvest grain crops within 21 days. Do not burn empty bags.
Malathion (Malathion 50, Malathion 500)	0.7 L/ac Up to 1.1 L/ac can be applied on forage crops	Cereals Corn Forages, Oil-seeds, Range-land, Non-crop areas	Do not apply within 7 days of harvest. Forages and and rangeland may be grazed immediately after treatment. Do not apply when the temperature is below 20°C.
Metha-midophos (Monitor)	0.5 L/ac	Canola	Apply not more than twice per season by ground or air. Apply with 80-400 L/ac water by ground, or not less than 4 L/ac water by air. Extremely toxic to humans, wear a protective pesticide respirator and standard pro-tective clothing.
Methoxychlor Methoxy-chlor, Marlate)	2.0-2.6 L/ac	Alfalfa, Clover	Use 12-40 L/ac water in aerial applications or sufficient water for good coverage with ground applications. Do not feed, graze or harvest within 7 days of application. Repeat as necessary at intervals of 7-10 days. Methox-ychlor is the safest insecticide to use on forage seed crops during the pollination period.

Insecticides and Wildlife

In 1985, questions arose concerning the impact of insecticide use on wildlife. Although the exact impact is difficult to measure, the pesticide applicator has a role to play in protecting wildlife through the selection and application of the insecticide he uses.

In sensitive bird habitats, such as roadsides, along slough margins and pastures, select the insecticide which is least toxic to wildlife. In cereal crops which are not prime habitat, more toxic materials can be used. In all cases, do not allow entry of insecticides into water, since they are toxic to fish as well as aquatic insects which are a staple food for fish and waterfowl.

The following table based on insecticide labels outlines the hazards to wildlife of the major insecticides used for grasshopper control.

INSECTICIDE	WILDLIFE LABEL WARNING
Carbaryl (Sevin XLR)	Avoid contamination of food, feed, water supplies, streams and ponds.
Carbofuran (Furadan 480)	Do not contaminate feed and foodstuffs. Keep out of areas inhabited by fish, birds, and wildlife as this product is highly toxic to such animals. May be hazardous to pheasant chicks.
Chlorpyrifos (Lorsban 4E)	Lorsban 4E insecticide is toxic to fish and crustaceans (small water living organisms related to insects). Do not contaminate water by cleaning equipment or disposing of wastes.
Deltamethrin (Decis)	Toxic to fish and aquatic organisms. Do not apply where streams, lakes, ponds, or water used by livestock or for domestic purposes may be contaminated.
Dimethoate E.C.	Highly toxic to birds, bees and other wildlife.
Dimethoate Bait	No warning.
Malathion	Avoid contaminating any water body containing fish.
Methamidophos (Monitor)	Toxic to fish and wildlife. Keep out of lakes, streams and ponds. Fish will be killed if their waters are contaminated with this product. Wildlife in contact with treated areas may be harmed.

Methoxychlor	Avoid contamination of ponds, lakes and streams of water used for domestic purposes.

How to Prevent Exposure to Pesticides

1. What to wear at all times:
A long sleeved shirt, long pants, hard hat and long rubber boots are recommended. A pair of cotton coveralls may be used instead of shirt and pants. This clothing leaves very little of your body exposed to the chemicals.

2. What not to wear:
Do not wear cloth or leather gloves, leather shoes or sneakers, or a baseball cap. These materials absorb pesticides and so may increase your exposure to the chemicals.

3. How to protect the hands, eyes, nose and mouth:
Wear neoprene gloves to avoid getting chemicals on the hands. Use goggles to protect the eyes, and a respirator to prevent inhalation of dusts, powders and sprays. Goggles should be chemical-resistant. Ask specifically for respirator cartridges that filter out pesticides.

If pesticide gets on the skin or into your gloves or boots, wash immediately with soap and water. If pesticide gets into the eyes, flush with clean water for 15 minutes and see a doctor immediately. Take the pesticide container label with you.

4. How to protect the face and clothes from splashes:
To protect the face, use a face shield or visor attached to your hard hat. To protect your clothes from spills and splashes, wear a neoprene apron or neoprene coveralls over your work clothes.

5. What to avoid:
Stand upwind when mixing or pouring pesticide to avoid inhaling the chemical. Don't drink, eat or smoke while using pesticide. Don't use your mouth to blow out clogged nozzles. Don't mix seeds and chemicals with your bare hands; wear neoprene gloves.

6. Where to buy safety equipment:
Several stores in major cities across Alberta sell safety clothing and equipment. Check the yellow pages under Safety Equipment and Clothing for the stores in your area.

7. What to do if you are ill after spraying:
Take the pesticide container label and the emergency telephone numbers listed below to the nearest doctor.

8. Emergency telephone numbers:
Department of Environment: 1-800-222-6514. The emergency department of most hospitals can deal with pesticide poisoning; however, information and treatment for poisoning can be obtained from the following four hospitals that are especially equipped to deal with such cases:

University of Alberta Hospital 83 Avenue and 112 Street Edmonton, Alberta 432-8822	Calgary General Hospital Calgary, Alberta 262-5982 (Poison control) 268-9625
Royal Alexandra Hospital 10240 Kingsway Avenue Edmonton, Alberta 474-3431	Foothills Hospital 1403 -29 Street N.W. Calgary, Alberta 270-1315

The following pesticide manufacturers have emergency telephone numbers to call in case of poisoning involving only their products:

For Dimethoate and Malathion
Chipman Incorporated
1-415-643-4123
(8:00 a.m. - 4:45 p.m)
1-416-528-6771

Cyanamid Canada Inc
1-415-356-8310

For Decis
Hoechst Canada
1-306-924-1500

For Furadan and Monitor
Chemagro Products
1-416-625-5280

For Sevin XLR
Union Carbide Ltd
1-304-744-3487

For Lorsban
Dow Canada Ltd
1-800-661-6436

Insecticides and Bees

Almost all insecticides applied to blooming crops and weeds are poisonous to honey bees that may be actively foraging during or shortly after insecticide application. If it is necessary to treat a crop on which honey bees are foraging, do so early in the morning or late in the evening when bees are not active.

The insecticides Decis and Sevin XLR both provide optimal grasshopper control under cool conditions, and are least toxic to bees if sprays are applied during the cooler evening or morning periods and dry on the plants prior to bee foraging.

The insecticide Furadan provides optimal control of grasshoppers when applied during the warmer part of the day but poses a great risk to honey bees foraging in the crop. Do not allow bees to forage on Furadan treated crops for at least 3 days.

If honey bee colonies are in the vicinity of the area to be sprayed, contact the beekeeper at least 48 hours before spraying so he/she can move the hives or confine the bees.

For information on local conditions, pesticide suppliers and commercial applicators, contact your local extension office. Other sources of information are: the Crop Protection Branch, Alberta Agriculture, Edmonton; the Regional Crops Laboratories, Olds and Fairview; the Alberta Environmental Centre, Vegreville; and Agriculture Canada Research Station, Lethbridge, Alberta.